

REMARKS

Favorable reconsideration and allowance of this application are requested.

By way of the amendment instructions above, the pending claims herein have been revised so as to express affirmative process steps and employ other language more commensurate with US practice. Such revisions are therefore being submitted for the purpose of clarity only and are not related to any issue respecting patentability.

The only issue remaining to be resolved in this application is the Examiner's rejection of all pending claims under 35 USC §103(a). As will become clear from the discussion which follows, the claims now pending herein are patentably distinguishable over the applied references of record.

In this regard, applicants note that the apparatus disclosed in the applied Reinhall reference is in the form of a relatively long container 14 provided with inlet and outlet means for the suspension and a stirrer 36 driven by an electric motor. Pulp material collected on the interior wall of the container 14 is scrapped off by the rotating blades 40 of the stirrer. Separate sets of perforations are provided in the wall of the container, each set of perforations communicating with a compartment located externally of the container for drainage of water pressed out of the fiber pulp suspension in the container. The compartments communicate through separate one-way valves with a common discharge conduit provided with a control valve. The pressure in the compartments is regulated but maintained lower than in the container to control drainage of water pressed out of the fiber pulp suspensions through the perforations. The suspension is preferably introduced under superatmospheric pressure into the container such as by means of a pump 48. The dewatered pulp passes from the outlet of the dewaterer into the inlet of a grinding machine by means of a screw conveyer 54.

The applied lyengar reference (US 4,582,568) discloses an apparatus for controlling the consistency of a pulp suspension. The apparatus is a combination of a screw thickener and a screw press. The purpose of the screw thickener is to remove liquid from pulp to such a degree that the inlet consistency of the screw press is maintained within a predetermined range. The screw thickener comprises a filter cylinder and a closed screw arranged therein. The structure of the closed screw is such that the screw flights extend from the shaft of the screw to the close proximity of the filter cylinder. At column 3, lines 34 through 38 it is suggested that the clearance between the screw flights and the filter surface is maintained as small as possible.

Furthermore, at column 3, lines 54 – 56, it is explained how there is a vertical discharge column providing a hydrostatic head of pulp suspension. What this disclosure means in practice, and especially as it is a question of an apparatus with a closed screw, is that the screw acts against the hydrostatic head compacting the material and thus pressing liquid from the pulp.

The Examiner argues that it would be obvious to substitute the screw conveyor of lyengar for the blades of Reinhall, and that the screw conveyor of lyengar would function in the same manner as the instant screw conveyor as they are the same structurally. Applicants respectfully disagree with such conclusions.

Specifically, according to the present invention, the screw is open so that the essentially non-thickened pulp is allowed to flow through the apparatus from the feeding end to the discharge end via the space between said cleaning member and the shaft of the apparatus. This may be arranged so that the screw thread (32) is fixed on the shaft (30) by means of tie rods which leave a free space between the shaft and the screw thread.

The function of the thickener of lyengar is carried out by an apparatus provided with a closed screw surrounded in a small clearance with a filter surface. The fiber

suspension is fed into the inlet end of the screw, wherefrom the screw further pushes the suspension against a hydrostatic pressure created by an upward directed discharge conduit arranged at the discharge end of the screw. A problem of the screw thickener described in the Iyengar patent is that the screw is closed, whereby as the apparatus stops, the flow of fiber suspension through the apparatus will also stop completely. Another problem is that the operational efficiency of the filter surface is relatively low, because the filter surface functions actively only in the vicinity of the inlet end. This is due to the characteristic feature of the closed screw that it feeds the pulp inside it as an essentially plug-like flow, whereby only the pulp layer facing the filter surface is efficiently thickened, the rest of the pulp passing nearer to the shaft of the screw without being essentially thickened. Liquid is filtrated to the filter surface only through a thickened pulp cake formed on the filter surface and the thickening rate is slow. This results in a highly limited capacity of the device, and raising the capacity is not easy, either, because the problem of the closed screw can only be eliminated by increasing the dimensions of the device.

Consequently, the combination of Reinhall and Iyengar does not result in the method of claim 1. The advantages of using an open screw are listed in the paragraph bridging pages 9 and 10 of the present application.

Gervasi (US 4,085,050) discloses a filter which is used to produce clear filtrate. Such a function is evident from the specification of Gervasi which explains in detail how the filtrate is recirculated in case the first filtrate is not clear enough. The filter discussed in Gervasi is not purposed to be employed in strictly a continuous operation irrespective of what the Gervasi's patent purports. In this regard, the first few lines on column 3 teach that the time between two shutdowns is increased. In other words, Gervasi takes it for granted as an accepted fact that there will necessarily be shutdowns in the normal operation of the filter. Clearly, it is not taught that the filter of Gervasi

would or could be used in thickening fiber suspensions of paper and wood processing industry.

The filter of Gervasi operates in such a manner that liquid with turbid particles is fed from above into the filter, and the filter cake is allowed to form on the precoat layer of the filter surface. The worm rotates slowly in close proximity to the filter surface and scrapes off the filter cake from the precoat layer. The filtered material is collected to the conical bottom portion of the device wherefrom the filtered material is removed via gate valve and suction pump only when the conical part is filled with said material (column 4, lines 48 through 58). Gervasi does not remove the whole cake located on the filtering surface, only a layer of cake formed on the precoat is removed, but the precoat layer is left on the surface.

In fact, it should be understood that the true operation of the filter discussed in Gervasi is such that, in the beginning of the operation cycle the entire device is filled with the liquid to be cleared. The filtering proceeds in such a manner that clear liquid is filtered through the filter surface and the filter cake is scraped down into the bottom cone. In other words, the filter cake as heavier material displaces the liquid from the bottom cone and gradually fills the bottom while new liquid is introduced into the device. The operation is continued until the bottom cone is filled whereafter the operation is shut down and the cone emptied.

The operation of the Gervasi filter clearly differs from that of the Reinhall apparatus, and thus an ordinarily skilled person would recognize that such references cannot be combined in the first instance. Also, in the present invention, the layer of thickened pulp is wiped off the filter surface of the pre-thickener with a cleaning member, and the layer of thickened pulp is pushed by the cleaning member along the filter surface to the discharge end of the apparatus.


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Therefore, the combination of Gervais with Iyengar and Reinhall is similarly inappropriate.

In view of the discussion above, applicants suggest that the rejection advanced under 35 USC §103(a) must be withdrawn. Such favorable action is solicited.

Respectfully submitted,

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